

LOF et al. -- 10/648,785
Attorney Docket: 081468-0305473

REMARKS

Claims 1-24 are pending. By this Amendment, claims 1, 17, 20, 22 and 23 are amended. Reconsideration in view of the following remarks is respectfully requested.

Applicants have not received the initialed, signed and dated PTO-1449 submitted with the application on August 27, 2003. Although the Examiner has cited U.S. Patent 4,616,130 to Omata, Applicants also cited U.S. Patent 4,630,922 to Imai et al. The Examiner is respectfully requested to initial the references, sign and date the PTO-1449 and return a copy to the undersigned in accordance with MPEP §609.

Claims 1, 5, 7, 17, and 20-24 were rejected under 35 U.S.C. §102(b) by Moriyama et al. (U.S. Patent 4,798,470). The rejection is respectfully traversed.

Claim 1 recites an alignment tool comprising a substrate configured to hold a substrate having a substrate mark. The substrate mark is at a different level from the rest of the surface of the substrate. An alignment system is configured to detect alignment between a reference mark and the substrate mark using an alignment beam of radiation. An optical element is adjustably positionable in the path of the alignment beam to adjust the focal plane of the alignment system to focus on the substrate mark at the different level from the rest of the surface of the substrate.

In response to Applicants' arguments in the previous response, the Examiner changed his interpretation of the reference and now alleges that Moriyama et al. disclose an optical element corresponding to the projecting lens 104, instead of the mark detecting optical systems 122 or 123, that is positionable in the path of the alignment beam to adjust the focal plane of the alignment system to focus on the substrate mark at a different level from the rest of the surface of the substrate. The Examiner also changed the interpretation of the claimed projection system from the projecting lens 104 of Moriyama et al. to the illuminator 129. However, it is respectfully submitted that regardless of which interpretation is proffered, there is no disclosure or suggestion by Moriyama et al. of either a substrate alignment mark which is at a different level from the rest of the surface of the substrate or an optical element positionable in the path of the alignment beam to adjust the focal plane of the alignment system to focus on the substrate mark at the different level, as recited in claim 1.

Applicants also respectfully request clarification of the Examiner's response on page 7, paragraph number 18 of the Office Action. The Examiner alleges that as shown in the drawings of Moriyama et al., the optical element, which the Examiner alleges corresponds to

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the projecting lens 104, is positionable. It is unclear which drawing the Examiner is referring to, but it is respectfully submitted that none of the drawings of Moriyama disclose or suggest that the projecting lens 104 is a positionable in the path of the beams from the illuminators 127 and 129 that illuminate the target marks 115 and 115' on the reticle 106.

The Examiner also states that the projecting lens 104 can be removed from its current location and placed as shown in Figure 8 and is thus positionable. It is unclear what the "current location" of the projecting lens 104 is and how it may come to be placed from its current location to the position in Figure 8, but it is respectfully submitted that neither the drawings nor the text of Moriyama et al. disclose or suggest that the projecting lens 104 is positionable. In fact, it is respectfully submitted that it is clear from the disclosure of Moriyama et al. that the projecting lens is not positionable

Moriyama et al. do not disclose or suggest a substrate alignment mark that is at a different level from the rest of the surface of the substrate. Moriyama et al. actually explicitly teach away from this feature. As disclosed in column 5, lines 30-31, the target marks 103 and 103' of the wafer 101 are formed on the peripheral portion 134 of the through-hole 121, i.e. the target marks 103 and 103' are formed on the surface of the wafer 101, not at a different level from the surface of the wafer 101. Moriyama et al. further disclose in column 5, lines 32-34, that forming the target marks 103 and 103' at the peripheral portions is advantageous because it makes it difficult for the target marks 103 and 103' to be affected during manufacturing. One of ordinary skill in the art clearly would not have been motivated to provide the target marks 103 and 103' of Moriyama et al. at a level different from the surface of the wafer 101.

In addition, as noted in the previous response, Moriyama et al. disclose in column 5, lines 57-59, that the reticle 106 and the wafer 101 are finely moved relative to each other so that the change in position in X, Y, Z directions are zero, thus effecting alignment. There is no disclosure or suggestion of adjusting the focal plane of the alignment system to focus the substrate mark 103 or 103' at a different level from the rest of the surface of the wafer 101 by adjustably positioning the projecting lens 104, or any other optical element, in the path of the alignment beam.

Claims 5, 7 and 17 recite additional features of the invention and are allowable for the same reasons discussed above with respect to claim 1 and for the additional features recited therein.

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Claim 20 recites a lithographic projection apparatus including an alignment tool including an alignment system configured to detect alignment between a reference mark and a substrate mark using an alignment beam of radiation, wherein an optical element is adjustably positionable in the path of the alignment beam to adjust the focal plane of the alignment system to focus on the substrate mark at a different level from the rest of the surface of the substrate.

As discussed above, there is no disclosure or suggestion by Moriyama et al. of an optical element adjustably positionable in the path of an alignment beam to adjust the focal plane of the alignment system to focus on the substrate mark at a different level from the rest of the surface of the substrate. Accordingly, Moriyama et al. cannot anticipate or render obvious claim 20.

Claim 21 recites additional features of the invention and is allowable for the same reasons discussed above with respect to claim 20 and for the additional features recited therein.

Claim 22 recites an alignment method comprising, *inter alia*, adjusting the focal plane of an alignment beam to focus on a substrate mark at a different level from the rest of the surface of the substrate by interposing an optical element into the alignment beam while detecting alignment.

There is no disclosure or suggestion by Moriyama et al. of adjusting the focal plane of an alignment beam to focus on a substrate mark at a different level from the rest of the surface of the substrate by interposing an optical element into the alignment beam while detecting alignment. As discussed above, Moriyama et al. provide the target marks 103 and 103' at the surface of the wafer 101 and not at a different level and move the reticle 106 and the wafer 101 relative to each other to affect alignment. Accordingly, Moriyama et al. cannot anticipate or render obvious claim 22.

Claim 23 recites a device manufacturing method comprising, *inter alia*, of an alignment beam to focus on a substrate mark at a different level from the rest of the surface of the substrate by interposing an optical element into the alignment beam while detecting alignment.

There is no disclosure or suggestion by Moriyama et al. of adjusting focal plane of an alignment beam to focus on a substrate mark at a different level from the rest of the surface of the substrate by interposing an optical element into the alignment beam while detecting alignment. Moriyama et al. disclose target marks 103 and 103' that are at the surface of the

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wafer 101 and not at a different level and affect alignment by moving the reticle and a substrate relative to each other. Accordingly, Moriyama et al. cannot anticipate or render obvious claim 23.

Claim 24 recites additional features of the invention and is allowable for the same reasons discussed above with respect to claim 23 and for the additional features recited therein.

Reconsideration and withdrawal of the rejection of claims 1, 5, 7, 17 and 20-24 over Moriyama et al. are respectfully requested.

Claims 3, 4, 6, 8-12, 18, 19 and 22 were rejected under 35 U.S.C. §103(a) over Moriyama et al. The rejection is respectfully traversed.

Claims 3, 4, 6, 8-12, 18, 19 and 22 recite additional features of the invention and are allowable for the same reasons discussed above with respect to claim 1 and for the additional features recited therein.

With respect to claims 3, 4, 6, 18 and 19, and page 4, paragraph numbers 8-10 and page 5, paragraph number 12, of the Office Action, it is respectfully submitted that the Examiner's reliance on the "design choice" motivation fails to present a *prima facie* case of obviousness as it is nothing more than an impermissible hindsight reconstruction of the claimed invention. Moreover, Moriyama et al. disclose in column 6, lines 1-7, how to accommodate for different thicknesses of the wafer portion containing the target marks 103 and 103', and does not disclose or suggest positioning the projecting lens 104, which the Examiner equates to the claimed optical element, to set the focal depth of the mark detecting system, or attaching the projecting lens 104 to the XY stage 111 or the fixing plate 131.

With respect to the Examiner's reasoning regarding claim 8, it is respectfully submitted that the determination of obviousness requires more than the conclusion that it is well known to alter an optical element to adjust the focal plane of an alignment beam. The determination of obviousness requires that the subject matter as a whole, including the invention and the prior art, be considered as a whole. In other words, regardless of what is or what is not "well known" to one of ordinary skill in the art, the question to be determined is whether it would have been obvious to one of ordinary skill in the art to alter the position of the projecting lens 104 of Moriyama et al. As discussed above, there is nothing in the disclosure of Moriyama et al. that discloses or suggests such a modification. The knowledge generally available to one of ordinary skill in the art fails to cure this deficiency of Moriyama et al. Just because it's known to adjust an optical element to adjust the focal plane does not

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support the conclusion that one of ordinary skill in the art would do so. In other words, the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. See MPEP § 2143.01.

Reconsideration and withdrawal of the rejection of claims 3, 4, 6, 8-12, 18, 19 and 22 are respectfully requested.

Claims 2 and 9-12 were rejected under 35 U.S.C. §103(a) over Moriyama et al. in view of Omata (U.S. Patent 4,616,130). The rejection is respectfully traversed.

Claims 2 and 9-12 recite additional features of the invention and are allowable for the same reasons discussed above with respect to claim 1 and for the additional features recited therein.

Reconsideration and withdrawal of the rejection of claims 2 and 9-12 are respectfully requested.

Applicants appreciate the indication that claims 13-16 define patentable subject matter. However, in view of the above amendments and remarks, Applicants respectfully submit that all the claims are allowable and that the entire application is in condition for allowance.

Should the Examiner believe that anything further is desirable to place the application in better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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